states explicitly of what these contents consist. This issue is, of course, in anticipation of the annual volume, which gives a complete record of the Association's proceedings at the particular meeting, but which cannot, in the nature of things, make its appearance until some time after its conclusion.

This practice of the Association, which is of comparatively recent origin, is altogether to be commended, and as a business proposition is to the credit of the management. Experience has shown that it meets a public demand. Members who attend a meeting are ready to purchase, at the comparatively low price of issue, a collected edition of the addresses, as are those who are unable to be present. The fact is significant of the increasing appreciation in which these addresses are held by the public. In the early days of the Association it was not considered obligatory on the part of a president of a section to prepare a special address by way of opening its proceedings, and he occasionally contented himself with a few general remarks before calling upon a member charged with the preparation of a report on the progress of the particular department of science with which the section concerned itself, either to read the report or to give an abstract of its contents. Failing the report he would call upon a member to present the first communication on the list, and in some such manner the business of the section would be begun. Gradually the present custom has been evolved, and the presidential addresses have become a valuable and most important feature of the work of the section—some people, indeed, would say the most valuable and important.

The presidents of sections nowadays are invariably representative men or women—recognised authorities on the special subjects with which the section deals. They are usually active workers in the development of knowledge on these subjects—persons with experience of research and of matured judgment, with a message of advice, counsel, or warning to communicate, or they may even promulgate a wholly new departure in scientific thought. Hence the eagerness and expectancy with which these utterances are awaited, not only by the professional members of the section but also by such portion of the general public as shows its interest in the progress of science either by attending the meetings of the Association, or following its proceedings in the press. The appreciation in which these sectional addresses are now held is further shown by the measures which the executive have been required to take in deference to public demand. Formerly the addresses were all given on the same day, and as a rule at the same hour, and they initiated the work of their respective sections. Nowadays special arrangements are made, so that members may have an opportunity of hearing as many as possible during the week over which the meeting extends. Their publication in collected form during the week of the meeting will be of service to those who for various reasons are unable to take advantage of such opportunity, and will be welcomed by others who may wish to study them in detail and at leisure. There are, of course, some, and they are particularly common among those of the student habit, upon whom the printed word makes a more effective impression than that spoken.

It is unnecessary on the present occasion to say anything at length concerning the contents of the volume before us. Any detailed examination or criticism is the more uncalled for, as most of the addresses themselves, slightly abridged in some cases, have been, or are being, reproduced in these columns. It is sufficient to say that the 1922 book worthily sustains the reputation which British Association addresses now enjoy, as well-written, scholarly productions, pregnant with thought, replete with fact and suggestion, stimulating and full of interest and inspiration to the contemplative kind. In an age which is pre-eminently scientific these books deserve the widest possible circulation, and in the interests of knowledge it is to be hoped that they will attain it.

Our Bookshelf.

Der fossile Mensch: Grundzüge einer Paläanthropologie. Von Prof. Dr. E. Werth. Erster Teil. Pp. iv + 336. (Berlin: Gebrüder Borntraeger, 1921.) 20*s.*

ENGLISH students who wish to know what their German colleagues think of recent discoveries of fossil man will be somewhat disappointed when they consult this work. Its author, Prof. Werth, who has published several books on the Ice-age and allied geological subjects, has either never heard of the fossil remains discovered at Piltdown and fully described by Dr. Smith Woodward, or refuses to believe in their authenticity; at least no mention is made of them. Nor is any allusion made to the remains found at Boskop, South Africa, the fossil skull found at Talgai, Queensland, nor those found by Prof. Eugene Dubois at Wadjak-Java. On the other hand, full and welcome accounts are given of two important finds made in Germany during war-time. One of these was made at Ehringsdorf, near Weimar, where two fossil lower jaws were found. These are attributed —and rightly so—to Neanderthal man, whose distribution is thus carried beyond the watershed of the Rhine. The other discovery, which was made at Obercassel, near Bonn, has revealed the remains of a man and of a woman belonging to the last phase of the Ice-age, and regarded by their discoverers as members of the so-called Cromagnon race. The skull of the man serves very well as the prototype of many a specimen found in neolithic graves in Scandinavia and Britain, but has such outstanding cheek-bones, zygomatic arches and angles of the jaw (or jowls) as have never been seen in

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European skulls hitherto. The width of the face in front of the ears is 153 mm., at the angles of the lower jaw 127 mm., betokening an extraordinary development of the masseter muscles. Notwithstanding these features, the skull is that of a strong, handsome, and big-headed man.

The opening chapters of this work are devoted to an orthodox and clearly worded description of Europe in the Ice-age. In dealing with human remains, Prof. Werth depends very largely on the methods and conclusions of Schwalbe and of Klaatsch. Prof. Werth accepts Schwalbe's verdict that Neanderthal man was not the precursor of modern man, but was extinguished by the arrival of the Aurignacian race in Europe. He is inclined to think the Cromagnon type represents a later invader of Europe, and accepts this type as the precursor of the long-headed modern Europeans—both of the dark Mediterranean and of the fair Scandinavian type. The work, of which this is Part 1, is well illustrated.

Studien an Infusorien über Flimmerbewegung, Lokomotion und Reizbeantwortung. Von Dr. Friedrich Alverdes. (Arbeiten aus dem Gebeit der experimentellen Biologie, Heft 3.) Pp. iv + 130. (Berlin: Gebrüder Borntraeger, 1922.) 12*s.*

The little book under notice is a record of careful work, chiefly upon the behaviour of *Paramœcium caudatum*, although the three other species of Paramœcium, *Stentor polymorphus*, and other Infusoria, figure in some of the experiments. The author has made an especially detailed study of the movements of Paramœcium and of the action of its cilia, and his observations on its morphology are not without interest. He discusses the behaviour of these organisms when operated upon, and also their reactions to narcotics and other chemical stimuli and to the galvanic current.

While the author admits the merit of Jennings's work in this field of study, he is, nevertheless, frequently in conflict with this worker, both in his observations of behaviour and his interpretations of them; but it is not certain that he thoroughly grasps Jennings's views, and it is noteworthy that the latest edition of "The Behaviour of the Lower Organisms" (Columbia Univ. Press, 1915) is not in Dr. Alverdes's Bibliography. Dr. Alverdes ranges himself energetically against all those who see in the Infusoria nothing but "small automata," and vigorously opposes the mechanistic interpretation of their behaviour. Like Jennings, he denies that the local action theory of tropisms can explain completely the behaviour of these organisms. He would substitute for it another view to which his researches have led him, but it is impossible, in the short space at our disposal, adequately to present this view or to criticise it. Undoubtedly Dr. Alverdes's work is careful, and is marked throughout by independence of mind. He insists, with admirable emphasis, that little progress can come from the study of the Protista in unusual media or in media which are artificially prepared upon physico-chemical principles alone. The same argument might be applied with profit to all other work on the Protista.

In spite of a rather difficult and discursive style, the book should not be neglected by those who are interested in the problems with which it deals.

An Introduction to Electrodynamics: From the Standpoint of the Electron Theory. By Prof. Leigh Page. Pp. vi + 134. (Boston and London: Ginn and Co., 1922.) 10*s.* net.

Hitherto the mathematical equations of electrodynamics have been based on the experimental conclusions of Coulomb, Ampère, and Faraday. Even books which discuss relativity go no further than showing that these equations are co-variant for the Lorentz-Einstein transformation. In Prof. Page's book, however, the equations are derived directly from the principle of relativity. The mathematician will appreciate this procedure as it is more logical, but we think that the average reader will find the older methods more convincing. The units chosen are those advocated by Heaviside and Lorentz. The value of the charge at any point is equal to the number of tubes of force diverging from the point; all matter is assumed to be made up of positive and negative electrons; electromagnetic force is defined in terms of the electric intensity of lines of force, and gravitational attraction between two electrons is supposed to be negligibly small. The electrons carrying a current are all of the same sign, and their masses are positive. Hence the "mass of the current" is greater than the sum of the masses of the individual electrons composing it.

The author's methods of calculating the radiation from electrons are to be commended, and he also gives a good account of Laue's theory of the diffraction of X-rays. The formulæ deduced for specific inductive capacity, magnetic permeability, and metallic conductivity agree fairly well with experimental results. The theories of Faraday's experiment showing the rotation of the plane of polarisation of light by a magnetic field and of the Zeeman effect are given briefly, but in a convincing way. We can commend this book to the electrician who has an advanced knowledge of mathematics and is interested in the latest theories.

Handbuch der biologischen Arbeitsmethoden. Herausgegeben von Prof. Dr. E. Abderhalden. Lieferung 55. Abt. V: *Methoden zum Studium der Funktionen der einzelnen Organe des tierischen Organismus.* Teil 6, Heft 3. *Sinnesorgane: Lichtsinn und Auge.* Pp. 365-462. (Berlin und Wien: Urban und Schwarzenberg, 1922.) 117 marks.

This portion of the work, Abderhalden's "Handbuch," is the direct continuation of parts 3 and 41 which dealt with the biophysical methods used in investigating the living eye and its sensitivity to light. The first section, by Dr. Vogt of Basel, is devoted to the method of examining the eye with light from which the red rays have been absorbed by passage through a concentrated solution of copper sulphate and a weak solution of erioviridine. With such light, investigations of the yellow spot are rendered much easier and more accurate. The second section of 76 pages, by Dr. Basler of Tübingen, deals with methods which in the main are intended to investigate the functions of the retina and its various parts. Sharpness of vision, irradiation, and detection of movement are some of the subjects dealt with. The concluding section, by Dr. Struycken of Breda, describes the photographic method he uses for studying the

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